

**UNITED STATES DISTRICT COURT**  
**SOUTHERN DISTRICT OF NEW YORK**

TONY ELICH, on Behalf of Himself and  
 All Others Similarly Situated,

*Plaintiff,*

v.

CBOE EXCHANGE, INC.; CBOE GLOBAL  
 MARKETS, INC.; CBOE FUTURES  
 EXCHANGE, LLC; BELVEDERE  
 TRADING, LLC; CITIGROUP  
 DERIVATIVES MARKETS, INC.;  
 CITIGROUP FINANCIAL PRODUCTS,  
 INC.; CITADEL SECURITIES, LLC;  
 CONSOLIDATED TRADING, LLC; CTC,  
 LLC; IMC FINANCIAL MARKETS LLC;  
 WOLVERINE TRADING LLC; and JOHN  
 DOES 1-50,

*Defendants.*

Case No. \_\_\_\_\_

**CLASS ACTION COMPLAINT**

**JURY TRIAL DEMANDED**

**INTRODUCTION**

1. This class action complaint seeks redress under the Sherman Act and the Commodities Exchange Act for investors in certain derivatives of the benchmark Volatility Index (“VIX”), as well as certain exchange-traded products derived therefrom, during specific trading sessions from January 1, 2008 to the present (“Class Period”). The allegations herein are based upon the investigation of Plaintiff’s counsel and information and belief.

2. The VIX is a benchmark index created by Defendant CBOE Exchange, Inc. (“CBOEI”), a wholly-owned subsidiary of Defendant CBOE Global Markets, Inc. (collectively, “CBOE”). Created in 1993, the VIX purports to measure the implied volatility of large cap U.S. stocks over 30 days in the future. The VIX has been popularly referred to as the “fear index.” As will be explained in greater detail below, the VIX is based on Standard & Poor’s 500 Index and estimates volatility exposure within that index.

3. While the VIX is a benchmark that cannot be traded, the CBOE has created tradeable contracts for VIX Futures and VIX Options, which has led to a number of exchange-traded products that are derived from other investment instruments that are similarly linked to the VIX (“VIX ETPs”)<sup>1</sup> (collectively “VIX Instruments”). VIX Futures were introduced in 2004, while the VIX Options were introduced in 2006. The price of VIX Futures and VIX Options are inextricably linked to VIX, including on settlement.

4. From the inception of tradeable contracts in 2004 to the present, trading activity in VIX Instruments has increased significantly. The average daily contract volume for VIX Futures rose from 1,731 contracts per day in 2006 to 300,568 contracts per day in 2017 (through August 24, 2017), a 17,263% increase. Meanwhile, the average daily volume of VIX Options in 2006 was 23,491, and rose to 687,181 in 2017 (through July of 2017), a 23,491% increase.

5. The exercise-settlement values of these VIX Futures and Options are determined using a Special Opening Quotation (“SOQ”) for Standard & Poor’s 500 Options (“SPX”) traded on the CBOE. As the CBOE explains:

The final settlement value for VIX futures and options is determined on the morning of their expiration date (usually a Wednesday) through a Special Opening Quotation (“SOQ”) of the VIX Index using the opening prices of a portfolio of SPX options that expire 30 days later. The opening prices of these options are determined through CBOE’s proprietary auction mechanism (Hybrid Opening System or HOSS). By providing market participants with a mechanism to buy and sell SPX options at the prices that are used to calculate the final settlement value for VIX derivatives, the VIX Index settlement process is “tradable.”

6. The SOQ is described more specifically below. It is generated as follows:

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<sup>1</sup> There are presently at least 18 active VIX-linked exchange-traded products (“VIX ETPs”) (and at least an additional 19 that have closed), which have a combined market cap of about \$3.4 billion. The VIX ETPs include the following: VelocityShares Daily Inverse VIX Short-Term ETN (“XIV”), iPath S&P 500 VIX Short-Term Futures ETN (“VXX”), ProShares Ultra VIX Short-Term Futures ETF (“UVXY”), VelocityShares Daily 2x VIX Short-Term ETN (“TVIX”), and ProShares Short VIX Short-Term Futures ETF (“SVXY”). ETPs are “hybrid instruments” under the CEA, 7 U.S.C. §1a(29), priced so their value is derived from other investment instruments.

The opening prices for the SPX options used to calculate the SOQ are determined through an automated auction mechanism on CBOE that matches locked or inverted buy and sell orders and quotes resting on the electronic order book prior to the opening of trading. This auction mechanism is known as the Hybrid Opening System (HOSS), which uses modified opening procedures on expiration days for VIX derivatives. The trade matching algorithm is pro-rata.

The selection process for the SPX series used to calculate the SOQ for expiring VIX derivatives is identical to that which is used to calculate the VIX Index itself. Specifically, the VIX Index methodology used to calculate the SOQ initially selects a universe of out-of-the-money SPX put and call options. It then excludes SPX series that have a zero bid price. Furthermore, the methodology truncates the SPX series used to calculate the VIX Index after encountering two consecutive series having “zero-bid” prices, even if further out-of-the-money series have “non-zero” bids.

7. Even as trading in VIX Instruments has increased, it has only recently been suggested that the VIX is being manipulated. The SOQ is highly susceptible to manipulation for a variety of reasons, including, but not limited to, the fact that it occurs during a fixed, short window--often during extended trading hours (“ETH”) in recent years--and that transactions in VIX Instruments settle in cash. Over the past year, evidence has become publicly available that strongly suggests, if not establishes, manipulation of the SOQ to influence the pricing of VIX Instruments. This Complaint seeks redress for investors who suffered actual damages at cash settlement of VIX Instruments on specific days in which VIX trading has been shown to be anomalous during the Class Period.

8. Weekly VIX futures started trading on July 23, 2015. Weekly VIX Options started trading on December 8, 2015. Expiration of these weekly instruments follows the same rules as expiration of monthly VIX Futures and Options. It is always 30 days before weekly S&P 500 option expiration--usually a Wednesday unless there are holidays. The first weekly VIX expiration was on August 5, 2015. On every Wednesday thereafter, VIX Options and Futures expired and these days are when the trading of VIX Instruments were most subject to manipulation.

9. The formula for the SOQ implemented by the CBOE allows designated market makers to greatly influence the VIX with low investment, or perhaps even by placing a token bid or trade in the system. The market makers for SPX Options identified herein as manipulating the VIX could only have done so with CBOE initiatives that changed the power of the “in the money” VIX instruments to the “out of the money” VIX Instruments.<sup>2</sup>

10. The CBOE earns revenues pinned to the liquidity of the VIX market, and so its financial incentives support increasing transactions in VIX Instruments. CBOE profits greatly from the transactions volume resulting from the manipulation it has enabled a chosen few trading firms to undertake. From 2015 to 2017, 40% of CBOE’s revenue growth (exclusive of its purchase of BATS trading platform) was driven by fees from VIX Futures and Options. In the second half of 2017, a quarter of CBOE’s revenues came from VIX Futures and Options.

11. In May of 2017, Professor John Griffin (the James A. Elkins Centennial Chair in Finance at the McCombs School of Business at the University of Texas-Austin (“McCombs”)) and Amin Shams, (a Ph.D candidate at McCombs), published a report in the *Review of Financial Studies* entitled “Manipulation of the VIX?” (“Griffin-Shams article”). They concluded:

We have shown that not only is it feasible to influence the VIX settlement but also we present price and volume patterns at settlement consistent with what one would expect from such strategic trading. In particular, a volume spike occurs (a) only at the time of the VIX settlement, (b) only in the OTM [out-of-the-money] options that are used to calculate the VIX, (c) not in similar S&P 100 Index (OEX) or S&P 500 ETF (SPY) options, which do not have a tradable volatility index, (d) proportional to the sensitivity of VIX to each strike price, and (e) with a jump for options that have a discontinuously higher weight in the VIX calculation, which does not occur at nonsettlement times. We thoroughly investigated alternative

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<sup>2</sup> As explained on one investment website, in options trading, the difference between “in the money” and “out of the money” is a matter of the strike price’s position relative to the market value of the underlying stock. An in the money option is one with a strike price that has already been surpassed by the current stock price, meaning the option holder is more likely to turn a profit. An out of the money option is one that has a strike price that the underlying security has yet to reach, meaning the option has little intrinsic value and is likely to yield only marginal returns, if any.

explanations of coordinated liquidity and two forms of hedging but find that these explanations do not fit the data as well as the manipulation hypothesis.

These findings have important implications for settlement design, regulators, enforcement, and investors. The deviations in the VIX account for an average of 31 basis points of movement in settlement values, which amount to over \$1.81 billion dollars in settlement price distortions for the upper-level VIX futures and options from 2008 to April 2015. The large size (\$108 billion dollars over our sample period) of VIX futures and options exposed to the settlement relative to size of SPX options at settlement, makes manipulation cost-effective for a large trader. Although in other markets these price deviations might create arbitrage possibilities money” and “out of the money” is a matter of the strike price’s position relative to the market value of the underlying stock. An in the money option is one with a strike price that has already been surpassed by the current stock price, meaning the option holder is more likely to turn a profit. An out of the money option is one that has a strike price that the underlying security has yet to reach, meaning the option has little intrinsic value and is likely to yield only marginal returns, if any for (and price correction by) those trading against them, we showed how the high transaction costs in less liquid SPX options during the nonsettlement window make such deviations feasible.

12. Despite this evidence, the CBOE has criticized this article and made no effort to undertake initiatives that would address or prevent such manipulation.

13. On February 12, 2018, there was made public a letter from a whistleblower to the Securities & Exchange Commission (“SEC”) and the Commodity Futures Trading Commission (“CFTC”) that disclosed that the whistleblower had submitted a TCR (tip, complaint or referral form) to the agencies. The letter said:

Our client’s TCR submission disclosed market manipulation scheme that takes advantage of a pervasive flaw in the Chicago Board Options Exchange (CBOE) Volatility Index (VIX). The flaw allows trading firms with sophisticated algorithms to move the VIX up or down by simply posting quotes on S&P options and without needing to physically engage in any trading or deploying any capital. This market manipulation has led to multiple billions in profits effectively taken away from institutional and retail investors and cashed in by unethical electronic option market makers.

Last week, the CBOE issued a statement and hosted a call to assure investors that the massive losses were limited to a small number of exchange-traded products (ETPs) that were flawed by design. Consistent with our TCR submission, we contend that the liquidation of the VIX ETPs last week was not due solely to flaws

in the design of these products, but instead was driven largely by a rampant manipulation of the VIX index.

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As described in detail in our TCR filing, the VIX is highly subject to manipulation by market participants with the ability to rapidly post quotes in the market for S&P options. That is because the VIX is a theoretical index, which does not rely on trading activity but mid-prices, that can be moved up or down by posting quotes without any physical trading taking place.

14. On February 14, 2018, Bart Chilton (“Chilton”), a former commissioner at the CFTC, said the VIX has been “suspect for at least seven years” and the allegations of the whistleblower “ring true to me.” Harvey Pitt (“Pitt”), former chairman of the SEC, has been quoted as saying on February 18, 2018 in a CNBC interview that “it’s quite clear that [VIX] options can be manipulated. And when there were complaints about possible manipulation, CBOE, as the marketplace, should have sprung into action.” This statement by the former chairman of the SEC lays fault at CBOE’s feet for failing to take corrective action.

15. In contrast, the CFTC and SEC are believed to be conducting an investigation in response to the whistleblower’s letter. It has also been reported that the Financial Industry Regulatory Authority (“FINRA”) is conducting its own separate investigation.

16. With respect to SPX Options, a large amount of control over the bidding and trading process is vested in Lead Market Makers (“LMMs”) appointed by the CBOE. Under CBOE Rule 8.15(b)(1), an LMM must “provide continuous electronic quotes (as defined in Rule 1.1 (ccc)) in at least the lesser of 99% of the non-adjusted option series or 100% of the non-adjusted option series minus one call-put pair.” Thus, LMMs designated by the CBOE are eligible to participate in the SOQ process and can exercise great influence in the settlement value of VIX Instruments.

17. In 2008, for the first time, the CBOE designated dual LMMs for SPX Options. In

October of 2012, it expanded the LMM structure for SPX Options so that more than two but no more than four LMMs could be designated. In 2014, the CBOE introduced ETH for both SPX Options and VIX Options. In that year and subsequent years, it designated three LMMs for each.

18. The CBOE's own documents indicate that designated LMMs for SPX Options (including SPX Weekly Options ("SPXW")) have included Defendants Belvedere Trading, LLC; Citadel Securities, LLC; Citigroup Derivative Markets, Inc., a wholly-owned subsidiary of Citigroup Financial Products, Inc.; Consolidated Trading, LLC; CTC, LLC; IMC Financial Markets LLC, and Wolverine Trading LLC. These Defendants are referred to collectively as the "Market Maker Defendants." Some of the Market Maker Defendants were also appointed as market makers in the VIX Instruments markets. For example, Citadel Securities, LLC, held Designated Primary Market Maker ("DPM") status in the VIX Weekly Futures market.<sup>3</sup>

19. There are other entities that cannot now be identified who participated in the conduct in question. They are identified herein as "John Does 1-25." Plaintiff is not yet able to identify the precise number and identities of all of the manipulators acting in concert with one another. However, the CBOE possesses that information — indeed, it is required to maintain it under the Commodity Exchange Act, 7 U.S.C. §7(d) — and Plaintiff will be able to use that information to identify the John Doe Defendants through discovery. These John Doe Defendants are included in the term "Market Maker Defendants."

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<sup>3</sup> The CBOE describes DPMs as follows:

A "Designated Primary Market-Maker" or "DPM" is a Trading Permit Holder organization that is approved by the Exchange to function in allocated securities as a Market-Maker on the trading floor. DPMs may apply to be allocated new listings (or classes being reallocated from another DPM organization) through an exchange sponsored solicitation process. Authorized Exchange staff will allocate the products based on performance, capacity, performance commitments, efficiency, competitiveness, and operational factors. Each DPM organization must have the appropriate number of Market Maker Permits to cover the cost of their option class allocations.

20. The Market Maker Defendants deploy capital to post offers and bids or enter into contracts on SPX Options collusively during the limited time window in which those options influence the SOQ settlement price of VIX Futures and VIX Options, and thereby manipulate the value of their more liquid holdings in VIX Futures and VIX Options in their favor. Essentially, the Market Maker Defendants use their CBOE-granted privileged access to the SPX Options market and their high-frequency trading algorithms to manipulate the VIX Index calculation in concert, and, by doing so, generate massive profits for their much larger positions in VIX Instruments.

21. This manipulation of the VIX has caused billions of dollars in losses for institutional and retail investors in VIX Instruments throughout the proposed Class Period. The whistleblower letter states that the conduct at issue “costs investors hundreds of millions of dollars each month.” As the Griffin-Shams article points out, the distortionary effect of SOQ manipulation on the trading of VIX Options and Futures from January of 2008 to April of 2015 was \$1.81 billion.

22. The CBOE should have been aware of the design of the method for calculating the SOQ permitted it to be manipulated in a single, narrow period of time with even low-premium trades by the Market Maker Defendants and was therefore flawed. Moreover, the CBOE was or should have been aware that designating the same Market-Makers in the SPX Options market and the VIX Futures and Options markets exacerbated the susceptibility of those markets to manipulation. All Defendants benefited from CBOE’s inaction in response to its knowledge that the VIX Index was being manipulated. Under 7 U.S.C. §7(d), CBOE was required to monitor and enforce compliance with its rules prohibiting abusive trade practices, including having adequate resources and capacity to “detect, investigate, and apply appropriate sanctions to any person that violates any rule of the contract market” of CBOE in regard to manipulative and abusive trading practices, and to “establish and enforce rules . . . to protect markets and market participants from



abusive practices committed by any party . . . [and] to promote fair and equitable trading on the contract market.” Despite knowing or having considerable reason to suspect that manipulation of the VIX Index was occurring through the VIX Instruments traded on CBOE’s markets, the CBOE took no effective action to stop the manipulation and collusion. Rather, it adopted a *laissez faire* approach, thereby enabling the manipulation to continue, while protecting the growth of VIX Instruments trading on its markets.

23. As noted above, Pitt and Chilton have been critical of the CBOE for allowing the VIX manipulation to flourish. After the Griffin-Shams article was published, the CBOE defensively dismissed it and declined to do anything about it.

24. The reason for this was greed. During a February 9, 2018 earnings call, the CBOE noted “new record trading volume in VIX options and futures, with each increasing 23 percent over the previous year.” In the third quarter of 2017, VIX futures were CBOE’s fastest-growing business and brought in the most revenue per contract. That period was also its highest quarter for the trading of VIX futures, with average daily volume of 331,000 daily contracts.

25. The CBOE also made returns from liquidity providers (“LPs”) (such as LMMs or DPMs) in the SPX Options market and the VIX Instruments markets. It imposed a sliding scale set of fees for transactions in both markets, which decreased as the number of transactions increased. For those LMMs or DPMs who wanted to be in the top tiers of firms engaging in transactions, the CBOE imposed a non-refundable “prepayment incentive” of \$2.4 million annually or \$200,000 per month.

26. With the proliferation of VIX Instruments, CBOE has seen net revenues increase, net transaction fees shoot up, and contract fees close to double. As a result of this growth fueled by VIX Instruments, the value of Class A common stock in CBOE’s holding company, CBOE Global Markets, Inc., has increased by over 300% since its inception in June 2010. This has

directly benefited CBOE officers and board members, who were compensated heavily with CBOE stock between 2010 and the present.

27. The Market Maker Defendants' manipulation of the VIX has caused injury to investors in VIX Instruments. Defendants' conduct violates Sections 1 and 3 of the Sherman Act, 15 U.S.C. §§ 1, 3, and the Commodity Exchange Act, 7 U.S.C. § 1 *et seq.* CBOE's actions in permitting VIX Instruments to be traded despite the fact that they are readily susceptible to such manipulation was and continues to be a violation of the Commodity Exchange Act, 7 U.S.C. § 25(b)(1).

28. Plaintiff, on behalf of himself and members of the proposed Class, seeks damages caused by Defendants' manipulation and Defendants' violations of the Sherman Act and the Commodity Exchange Act, including treble damages and injunctive relief.

### **PARTIES**

29. Plaintiff Tony Elich transacted in the exchange-traded product XIV during the Class Period and has been injured by reason of Defendants' violations of law as alleged herein.

30. Defendant CBOE Exchange, Inc. is a Delaware corporation with its principal place of business at 400 South LaSalle Street, Chicago, Illinois 60605. CBOE Exchange is a wholly owned subsidiary of CBOE Global Markets, Inc., which is also a Delaware corporation with its principal place of business at 400 South LaSalle Street, Chicago, Illinois 60605. Defendant CBOE Futures Exchange, LLC is a Delaware limited liability company with its principal place of business at 400 South LaSalle Street, Chicago, Illinois 60605.

31. Defendant Belvedere Trading, LLC ("Belvedere") is a proprietary trading firm with its headquarters at 10 South Riverside Plaza, Suite 2100, Chicago, Illinois 60606. The CBOE appointed Belvedere as an LMM in SPX/SPXW options during ETH beginning in March of 2016. As of March of 2018, Belvedere was listed among those serving as an LMM for SPX

Options. Belvedere was also appointed an LMM in VIX Options market.

32. Defendant Citigroup Derivatives Markets Inc. (“CDMI”) offers security market services. Its offices are at 130 Cheshire Lane, Suite 102, Minnetonka, Minnesota 55305. It is a wholly-owned subsidiary of Defendant Citigroup Financial Products, Inc. (“CFPI”), which is located at 388 Greenwich Street, 17th Floor, New York, New York 10013. CDMI and CFPI are referred to collectively herein as “Citigroup.” In October of 2008, Citigroup was appointed by CBOE as an LMM for SPX Options. In November of 2008, CDMI was also appointed as an LMM for OEX, CBOE’s exchange for the S&P 100.

33. Defendant Citadel Securities LLC (“Citadel”) is a trading firm with its headquarters at 131 South Dearborn Street, Chicago, Illinois 6060. Citadel is an LMM for SPX Options. In September of 2010, the CBOE announced that it was introducing Weekly VIX Futures and appointed Citadel as the DPM for that product.

34. Defendant Consolidated Trading, LLC (“Consolidated”) is a proprietary trading firm its headquarters at 71 South Wacker Drive, Suite 2300, Chicago, Illinois 60606. The CBOE appointed Consolidated is an LMM for SPX/SPXW Options commencing in 2015 and continuing thereafter. Consolidated was also appointed as an LMM for VIX options during ETH commencing in March of 2016.

35. Defendant CTC, LLC (“CTC”) is a proprietary trading firm with its headquarters at 440 South LaSalle, 4th Floor, Chicago, Illinois 60605. The CBOE appointed CTC as an LMM for SPX Options in 2008. CTC was also appointed as an LMM for SPX/SPXW Options during ETH in March of 2016 and as an LMM in VIX options during ETH commencing in March of 2016.

36. Defendant IMC Financial Markets LLC (“IMC”) is a trading firm with its headquarters in Amsterdam, the Netherlands, and offices in Chicago, Illinois. The CBOE

appointed IMC as an LMM for SPX/SPXW Options during ETH commencing in March of 2016. Commencing in 2015, IMC was appointed an LMM in VIX Options during the ETH.

37. Defendant Wolverine Trading, LLC (“Wolverine”) is a trading firm with its headquarters located at 175 W. Jackson Boulevard, Suite 200, Chicago, Illinois 60604. Wolverine was appointed by the CBOE to be an LMM for SPX Options for 2013 and 2014.

38. Defendants Belvedere, Citadel, Citigroup, Consolidated, CTC, IMC and Wolverine, by virtue of their designations by CBOE as LMMs for SPX and/or SPXW Options, either during ETH or otherwise, were able to participate in the development and setting of SOQs that directly influenced settlement prices for VIX Instruments.

39. In addition, Belvedere, Citadel, Consolidated, CTC, and IMC, by virtue of their positions as LMMs or DPMs for VIX Options, either generally or during ETH, were also able to profit in the manipulation of settlements of VIX Options as described herein.

40. Doe Defendants 1-50, which are included in the definition of “Market Maker Defendants” consist of persons or entities that joined in the antitrust violation and Commodity Exchange Act violations of the Market Maker Defendants identified by name. Plaintiff reserves the right to amend his complaint once the identity of these persons or entities becomes known.

41. And all of the Market Maker Defendants had the ability to make trades on the VIX Instruments markets (regardless of whether they were a designated LMM on the VIX Instruments market). Thus, their actions in manipulating trading in SPX Options in order to influence the SOQ, which in turn determines the pricing for VIX Instruments, enabled them to profit on the VIX Instruments.

#### **JURISDICTION AND VENUE**

42. Defendants resided, transacted business, were found, or had agents in this District; a substantial part of the events giving rise to Plaintiff’s claims arose in this District; and a

substantial portion of the affected interstate trade and commerce described herein has been carried out in this District.

43. The activities of Defendants were within the flow of, were intended to, and did have a substantial effect on the interstate commerce of the United States.

### **FACTUAL ALLEGATIONS**

44. The allegations made previously in this Complaint are incorporated by reference.

#### **I. BACKGROUND AND STRUCTURE OF VIX AND VIX INSTRUMENTS**

##### **A. The VIX Benchmark**

45. VIX is a benchmark index that measures the 30-day expected volatility of the S&P 500 Index for large cap U.S. stocks. First introduced in 1993, VIX is calculated and published by CBOE every fifteen seconds during CBOE's regular trading hours (8:30 a.m. to 3:15 p.m. Central time) and extended trading hours (2:00 a.m. to 8:15 a.m. Central time), based on the prices of certain "put" and "call" SPX Options traded during those time periods.<sup>4</sup>

46. The VIX is calculated by a formula that uses as inputs the prices for out-of-the-money call and put options on the S&P 500, as well as the time to expiration:

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<sup>4</sup> A "put" or "put option" is a financial contract which gives the owner the right, but not the obligation, to sell an agreed quantity of a commodity or financial instrument (the underlying), at a specified price (the strike), by a predetermined date (the expiration date). A "call" or "call option" is a financial contract which gives the owner the right, but not the obligation, to buy an agreed quantity of a commodity or financial instrument (the underlying) at a certain time (the expiration date) for a certain price (the strike price).

$$\sigma^2 = \frac{2}{T} \sum_i \frac{\Delta K_i}{K_i^2} e^{RT} Q(K_i) - \frac{1}{T} \left[ \frac{F}{K_0} - 1 \right]^2 \quad (1)$$

WHERE...

$\sigma$ is	$VIX/100 \Rightarrow VIX = \sigma \times 100$
T	Time to expiration
F	Forward index level desired from index option prices
$K_0$	First strike below the forward index level, F
$K_i$	Strike price of the ith out-of-the-money option; a call if $K_i > K_0$ ; and a put if $K_i < K_0$ ; both put and call if $K_i = K_0$ .
$\Delta K_i$	Interval between strike prices - half the difference between the strike on either side of $K_i$ : $\Delta K_i = \frac{K_{i+1} - K_{i-1}}{2}$ (Note: $\Delta K$ for the lowest strike is simply the difference between the lowest strike and the next higher strike. Likewise, $\Delta K$ for the highest strike is the difference between the highest strike and the next lower strike.)
R	Risk-free interest rate to expiration
$Q(K_i)$	The midpoint of the bid-ask spread for each option with strike $K_i$ .

47. The evolution of the VIX Index has been described as follows by CBOE:

In 1993, the Chicago Board Options Exchange® (CBOE®) introduced the CBOE Volatility Index® (VIX® Index), which was originally designed to measure the market's expectation of 30-day volatility implied by at-the-money S&P 100® Index (OEX® Index) option prices. The VIX Index soon became the premier benchmark for U.S. stock market volatility. It is regularly featured in the Wall Street Journal, Barron's and other leading financial publications, as well as business news shows on CNBC, Bloomberg TV and CNN/Money, where VIX is often referred to as the "fear index."

Ten years later in 2003, CBOE together with Goldman Sachs, updated the VIX to reflect a new way to measure expected volatility, one that continues to be widely used by financial theorists, risk managers and volatility traders alike. The new VIX is based on the S&P 500® Index (SPXSM), the core index for U.S. equities, and estimates expected volatility by averaging the weighted prices of SPX puts and calls over a wide range of strike prices. By supplying a script for replicating volatility exposure with a portfolio of SPX options, this new methodology transformed VIX from an abstract concept into a practical standard for trading and hedging volatility.

In 2014, CBOE enhanced the VIX Index to include series of SPX Weeklys. First introduced by CBOE in 2005, weekly options are now available on hundreds of indexes, equities, ETFs and ETNs and have become a very popular and actively-traded risk management tool. Today, SPX Weeklys account for one-third of all

SPX options traded, and average over a quarter of a million contracts traded per day.

The inclusion of SPX Weeklys allows the VIX Index to be calculated with S&P 500 Index option series that most precisely match the 30-day target timeframe for expected volatility that the VIX Index is intended to represent. Using SPX options with more than 23 days and less than 37 days to expiration ensures that the VIX Index will always reflect an interpolation of two points along the S&P 500 volatility term structure.

48. Calculation of VIX is dependent upon the price of SPX Options as a stand-in to measure expected near-term volatility because one component in the price of SPX Options is an estimate of how volatile the S&P 500 will be between now and the option's expiration date, allowing the volatility that the market expects in the S&P 500 over the next 30 days to be estimated from SPX Option prices settling around 30 days from the present. If expected near-term future volatility (and thus swings in the market price of the S&P 500) is high, SPX Options (which serve as a means to hedge against large swings in the price of the S&P 500) are more valuable and thus more expensive. If expected near-term future volatility is low, the benefits of holding SPX Options to hedge against swings in the S&P 500 is lower, and therefore the prices of SPX Options are also cheaper.

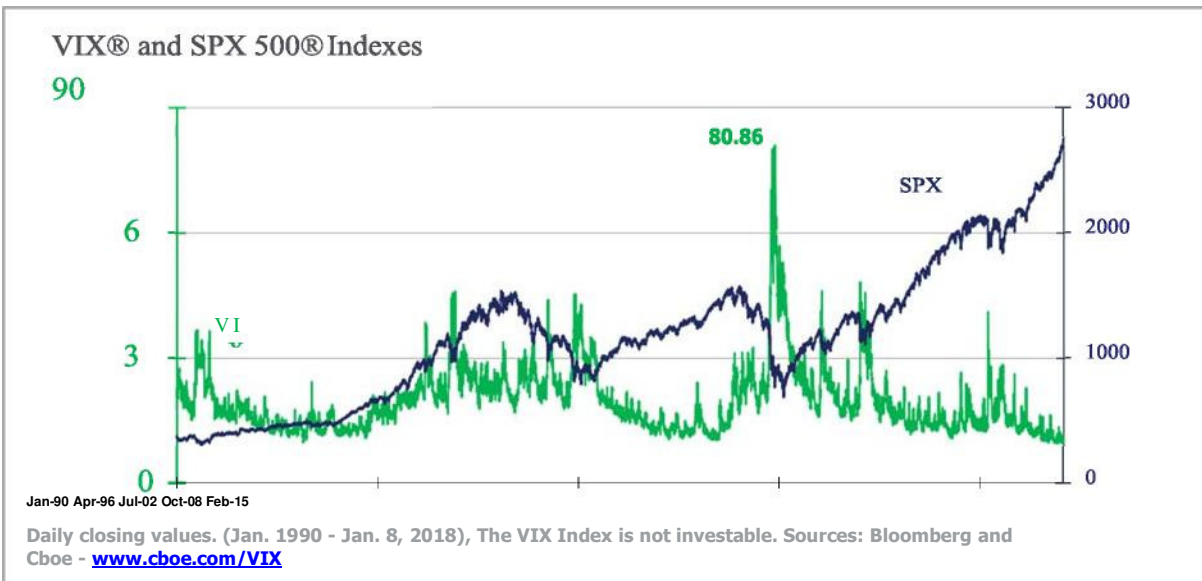
49. As the CBOE has explained:

The VIX calculation measures 30-day expected volatility of the S&P 500 Index. The components of the VIX calculation are near- and next-term put and call options with more than 23 days and less than 37 days to expiration. These include SPX options with "standard" 3rd Friday expiration dates and "weekly" SPX options that expire every Friday, except the 3rd Friday of each month. Once each week, the SPX options used to calculate VIX "roll" to new contract maturities. For example, on the second Tuesday in October, the VIX index would be calculated using SPX options expiring 24 days later (i.e., "near-term") and 31 days later (i.e., "next-term"). On the following day, the SPX options that expire in 30 calendar days would become the "near-term" options and SPX options that expire in 37 calendar days would be the "next-term" options.

In this hypothetical example, the near-term options are "standard" SPX options with 25 days to expiration, the next-term options are P.M.-settled SPX Weeklys with 32 days to expiration; and the calculation reflects prices observed at 9:46

a.m. Chicago time. For the purpose of calculating time to expiration, “standard” SPX options are deemed to expire at the open of trading on SPX settlement day - the third Friday of the month, and “weekly” SPX options are deemed to expire at the close of trading (i.e., 3:00 p.m. CT).

50. The following charts from CBOE’s website depict how the VIX and SPX 500 indices have compared over time.



**VIX® Index – Average daily closing value per year**

2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
12.8	17.5	32.7	31.5	22.5	24.2	17.8	14.2	14.2	16.7	15.8	11.1

Source: Cboe



**B. VIX Futures and VIX Options**

51. CBOE created VIX-linked products because it wanted to monetize the VIX and utilize it as a directly traded benchmark, *i.e.*, to generate profits. Futures and options are types of contracts that CBOE is authorized to create and offer as a board of trade designated as a contract market under the Commodity Exchange Act. However, CBOE can only list contracts “that are not readily susceptible to manipulation.” 7 U.S.C. §7(d)(3).

52. The CBOE therefore created VIX Futures and VIX Options. As it has explained:

On March 24, 2004, CBOE introduced the first exchange-traded VIX futures contract on its new, all-electronic CBOE Futures Exchange (CFE®). Two years later in February 2006, CBOE launched VIX options, the most successful new product in CBOE history. In just ten years since the launch, combined trading activity in VIX options and futures has grown to over 800,000 contracts per day.

The negative correlation of volatility to stock market returns is well documented and suggests a diversification benefit to including volatility in an investment portfolio. VIX futures and options are designed to deliver pure volatility exposure in a single, efficient package. CBOE/CFE provides a continuous, liquid and transparent market for VIX products that are available to all investors from the smallest retail trader to the largest institutional money managers and hedge funds.

53. VIX Futures are a type of futures known as financial futures, which are a contract that depends on the value of an index at some future date. The buyer (known as the “long” position) of a financial futures contract that is based on the value of a specified index might promise to buy 100 times the value of that index on a defined future date (the “settlement date”), and the seller (known as the “short” position) will receive that price on that date.

54. The CBOE describes VIX Futures on its website as follows:

VIX® volatility index futures provide a pure play on implied volatility independent of the direction and level of stock prices. VIX® futures may also provide an effective way to hedge equity returns and to diversify portfolios.

55. The parties may close their position in the financial futures contract at any time prior to the settlement date by buying or selling an offsetting obligation. Alternatively, they can hold the financial futures contract through the settlement date, at which point the long position

can either receive cash from, or pay cash to, the short position, depending on whether the price it agreed to pay for the financial futures contract is above or below the price of the specified index at the time of settlement (the “spot price”).

56. The price of a VIX Future will increase if market expectations for volatility increase above current expectations (as reflected by the current VIX price) and will decrease if market expectations for volatility decrease below current levels (as reflected by the current VIX price). As explained by CBOE:

Assume, for example that today is August 10 and the VIX index is 20. If market expectations are for 30-day implied volatility to be higher than 20 in October and lower than 20 in December, then October VIX futures will be trading at a level above 20 and December VIX futures will be trading below 20.

57. Investors can also take positions that have exposure to underlying VIX Futures by trading VIX Options. VIX Options can be either put or call options.

58. A VIX call Option gives the holder the right, but not the obligation, to buy a particular VIX Futures Contract at a specified price, known as the “strike price,” at some predetermined date in the future. The option to purchase the contract is said to “expire” when the future date in question comes to pass. An investor typically buys a VIX call Option when he expects the price of the corresponding VIX Future to rise above the call’s strike price.

59. Conversely, a VIX put Option gives the holder the right, but not the obligation, to sell a VIX Futures Contract at the strike price at the date of expiration. The buyer of a VIX put option will be “in-the-money” if the price of the corresponding VIX Futures price drops below the put’s strike price.

### **C. The Settlement of VIX Futures and Options**

60. As discussed above, the final settlement value for VIX Futures and Options is not determined the same way as the standard VIX benchmark calculation. Rather, final settlements

are derived based on a modified calculation known as the Special Opening Quotation or SOQ. The SOQ is calculated using the auction clearing prices of SPX options.

61. The settlement of standard (30-day) VIX Futures and Options contracts generally occurs on the third or fourth Wednesday of each month that is 30 days prior to the third Friday of the calendar month immediately following the month in which the contract expires. For example, July 2010 VIX Futures contracts expired on Wednesday, July 21, 2010, which was 30 days prior to Friday, August 20, 2010.

62. The CBOE's proprietary auction mechanism, known as the Hybrid Opening System or HOSS, determines opening prices for the constituent SPX Option series used in calculating the SOQ of VIX Futures and Options. The CBOE has explained the 2017 iteration of HOSS as follows:

The exercise / final settlement value for volatility index contracts is a Special Opening Quotation (SOQ) of the respective volatility index calculated from the sequence of opening prices, as traded on CBOE, of a single strip of the constituent option series used to calculate the volatility index on the exercise / final settlement date. The opening price for any constituent option series in which there is no trade on CBOE will be the average of that option's bid price and ask price as determined at the opening of trading.

The opening prices for the constituent option series used in calculating the SOQ are determined through an automated auction mechanism (modified HOSS opening procedures) that matches buy and sell orders residing on the electronic order book immediately prior to the opening of trading. The first market disseminated by CBOE after the opening may differ from the bid/ask quote used in the calculation of the SOQ of the respective volatility index. This is because, immediately after the series is opened but prior to dissemination of an opening bid/ask quote, the auction mechanism automatically cancels all unexecuted "OPG" (Opening) contingency orders. However, OPG orders (as well as the other orders existing in the electronic book immediately before the series opens) will be considered in calculating the SOQ, but OPG orders will not be disseminated upon the series opening. For example, assume a constituent option series has only 1 order to buy, and that order is priced at \$.05 (OPG), and the best offer is \$0.15. The first market disseminated to OPRA by CBOE would be \$0 - \$0.15, but the bid/ask quote used to calculate the SOQ would be \$.05 - \$0.15.

63. The settlement price determined by the SOQ uses a formula similar to the spot

VIX benchmark. The forward SPX price is decided by the strike which has the smallest absolute difference in price between the calls and puts. It then selects strikes using the forward SPX level to determine which puts and calls are included in the calculation the same as with the spot VIX benchmark until it reaches two consecutive zero bid strikes (see paragraph 30, *supra*). Using just those strikes and forward level, the settlement price is determined through application of the same formula used to calculate the spot VIX index.

64. VIX trading expanded greatly on the heels of the Financial Crisis of 2007-08. Between January 1, 2007 and December 31, 2009, the VIX closed above 24 on 376 out of 756 trading days (49.7% of trading days), closing at an all-time high of 80.86 on November 20, 2008.

#### **D. The CBOE's Role in the VIX**

65. The CBOE was central to the creation of the VIX and the explosion in trading in VIX Instruments. The CBOE was solely responsible for determining and selecting the formula used to calculate VIX, as well as the modified SOQ calculation process used to determine the settlement price of VIX Futures and Options. The SPX Options that influence VIX, VIX Futures, and VIX Options are all traded exclusively on the CBOE under the Commodity Exchange Act.

66. As discussed above, during the Class Period of the VIX manipulation (2008 to the present), trading in VIX Instruments skyrocketed. The following charts demonstrate the rapid growth in average daily trading volume in both VIX Options and VIX Futures from 2006 through the first half of 2017:



67. The CBOE charges a fee for every transaction involving VIX Futures and Options contracts. CBOE's revenue from overall transaction fees increased almost four-fold during the Class Period, climbing to approximately \$1.56 billion in 2017.

68. The CBOE has profited handsomely from the creation of the VIX and its pivotal role in the VIX market, and it has a vested interest in ensuring the VIX flourishes. The CBOE's

2017 earnings release states the following with regard to VIX products:

- Excluding legacy net revenue contribution, the CBOE's organic net revenue was \$154.1 million, up \$11.1 million or 8%, compared to the fourth quarter 2016. The increase is primarily attributable to stronger trading volume and higher revenue contributed from VIX futures and proprietary index options.
- Net transaction fees generated by the CBOE's proprietary index options accounted for 83% of options net transaction fees and were up \$10.3 million or 13% versus the fourth quarter of 2016 combined. The increase resulted from an 18% increase in index options ADV (average daily volume), driven by increases of 24% and 18% in VIX and SPX Options, respectively, offset somewhat by a 4% decrease in the RPC for index options to \$0.682 from \$0.712 in last year's fourth quarter.
- Futures net revenue of \$35.6 million increased \$8.5 million or 31%, primarily due to higher transaction fees resulting from a 21% increase in VIX futures ADV and a 7% increase in RPC. The RPC (revenue per contract) rose to \$1.799 in the fourth quarter of 2017 compared with \$1.683 in the fourth quarter of 2016, primarily due to pricing changes implemented in January 2017.
- In 2017, the trading volume in VIX futures set a new record for the 13th consecutive year with ADV of 294,000 contracts, up 23 percent compared with 2016. According to CBOE's 2016 Annual Report, CBOE's "transaction fees generated by our futures and index options increased from approximately 57.5% of total transaction fees in 2011 to approximately 88.2% in 2016. This increase is primarily due to increased trading volume and fees generated by our proprietary VIX options and futures SPX options" with "[t]he bulk of this revenue . . . attributable to [CBOE's] S&P 500 Index options and VIX Index options and futures."

69. This growth in CBOE earnings as a result of transaction fees related to trading in VIX Futures and VIX Options has also contributed to considerable growth in the value of shares in CBOE Global Markets, Inc., the holding company of CBOE. Since June 14, 2010 (when the CBOE's former non-stock corporation owned by its CBOE seat-holding members was converted via a restructuring transaction into CBOE Global Markets Class A common stock owned by its stockholders), the value of a share of CBOE Global Markets common stock has risen from an IPO price of \$29 to a March 13, 2018 closing price of \$119.93 — a 300%+ increase in value. An

April 6, 2017 CBOE Notice of Proxy Meeting Statement reveals that all serving directors, nominees, and executive officers of CBOE collectively held 2,099,085 shares of CBOE common stock – all of which had been awarded to those directors, nominees, and executive officers since 2010.

70. Under the Commodity Exchange Act, 7 U.S.C. §7(d), CBOE is also required to monitor and enforce compliance with the rules of the contract market, including rules prohibiting abusive trade practices and market manipulation. The CBOE Office of Enforcement is responsible for resolving disciplinary matters on behalf of the exchanges operated by CBOE. The Department of Market Regulation (“DMR”) is ultimately responsible for monitoring CBOE’s compliance with trading rules and procedures, including the surveillance and investigative work required therein.

71. Surveillance for the CBOE Futures Exchange (“CFE”) is conducted by FINRA and the National Futures Association (“NFA”), pursuant to a Regulatory Services Agreement (“RSA”). As the largest independent regulator for securities firms conducting business in the United States, FINRA has at its disposal a vast array of surveillance systems that are deployed throughout a broad swath of financial markets. By virtue of these systems, FINRA is uniquely situated to effectively detect manipulation that occurs across multiple markets. However, CBOE has thwarted those efforts.

72. Indeed, FINRA and the CBOE acknowledged as much, in connection with the above-referenced RSA entered into between these entities, effective January of 2015. FINRA has further stated in its Annual Reports: “[o]ur cross-market surveillance patterns allow us to track orders from their inception, as they move through markets and are either cancelled, replaced or executed. This is particularly important since some market participants are increasingly dispersing their activity across trading venues in an effort to mask improper trading schemes.



More than 50 percent of our trading alerts involve conduct occurring on more than one market, and more than 45 percent of our cross-market alerts involve two or more market participants.”

73. Upon information and belief, as VIX Futures trading grew substantially during the Class Period, CBOE prevented adequate surveillance of the market by FINRA and the NFA, thereby allowing the manipulation to continue unabated and undetected. The CBOE deliberately sought to maintain the surveillance of VIX Futures separate and apart from the larger surveillance objectives handled by FINRA and the NFA. Under the RSA with FINRA and the NFA, the enforcement tasks not covered by the NFA in the Futures market, including audit trail examinations, quoting reviews, intra-day monitoring, and importantly, VIX expiration review, are handled by CBOE’s Department of CFE Regulation (“CFER”). By maintaining the exclusive purview of the VIX expiration within its own CFER, CBOE was able to ensure that manipulation surrounding the VIX expiration would not be detected by a third- party regulatory organization such as FINRA or the NFA.

74. Along similar lines, FINRA has the capabilities to conduct cross-market surveillance which, in theory, would have detected the VIX manipulation that, by its very nature, involves two distinct markets: (a) the affected market for VIX Instruments, and (b) the market for S&P 500 options market which is used to manipulate the SOQ settlement value for the VIX Instruments. However, the CBOE did not enter into the FINRA RSA until January 2015, and even then, any effort by FINRA to use its cross-market surveillance to detect cross-market manipulation of the VIX was effectively neutered by weaknesses in CBOE’s CFER. For instance, according to a June 24, 2016 oversight report from the CFTC, CBOE’s CFER had significant weaknesses in its ability to monitor market manipulation, including “[a] considerable amount of staff turnover during the target period [of March 1, 2014 to February 28, 2015 that] prevented the Exchange from maintaining, on a consistent basis, sufficient compliance staff to conduct and



complete investigations in a timely manner.”

## **II. THE MARKET MAKER DEFENDANTS CONSPIRED TO FIX THE PRICES OF VIX INSTRUMENTS**

75. The method by which VIX is calculated is particularly vulnerable to manipulation. If a VIX trader is long in VIX futures, it can push the VIX up by buying out-of-the-money SPX options. Likewise, if it is short in VIX futures, it can push the settlement down by colluding with other VIX traders to sell or write out-of-the-money SPX Options. Although market participants can enter into trades of SPX options for legitimate purposes, a variety of emerging information indicates that such trades have often been executed manipulatively and in concert by the Market Maker Defendants.

76. Essentially, parties manipulating VIX use the access granted to them by the CBOE as LMMs in the SPX Options market to collude amongst themselves to affect the VIX Index calculation, resulting in the VIX settlement occurring at an artificial price.

77. The Griffin-Shams article offered several key findings: (1) at the exact time of the monthly VIX settlement, highly statistically significant trading volume spikes occur in underlying SPX options; (2) the spikes occur only in out-of-the-money SPX options — those utilized for the VIX settlement calculation — and more so for those with greater influence on the calculation; (3) there is no spike in volume for the similar S&P 100 Index or in S&P 500 Exchange Traded Fund options, which are not connected to the VIX; and (4) traders manipulated the settlement by optimally spreading their trades across the SPX option strikes and increasing the number of trades in deep out-of-the-money put options consistent with the VIX formula, despite such options rarely being traded otherwise.

78. According to the Griffin-Shams article, the steps required for a trader to manipulate the VIX settlement are as follows: (1) open long positions in the VIX derivatives

prior to settlement; (2) submit aggressive buy or sell orders in the SPX options during the settlement auction, thereby causing the auction-clearing prices of SPX options, and by extension, the VIX settlement price to rise or fall; and (3) obtain the higher or lower price desired for the VIX Futures or Options when they settle. Traders colluding with one another can manipulate the VIX either up or down without the risk that counteracting market movements will offset or negate their gains.

79. The Griffin-Shams article explained how SOQs are determined as follows:

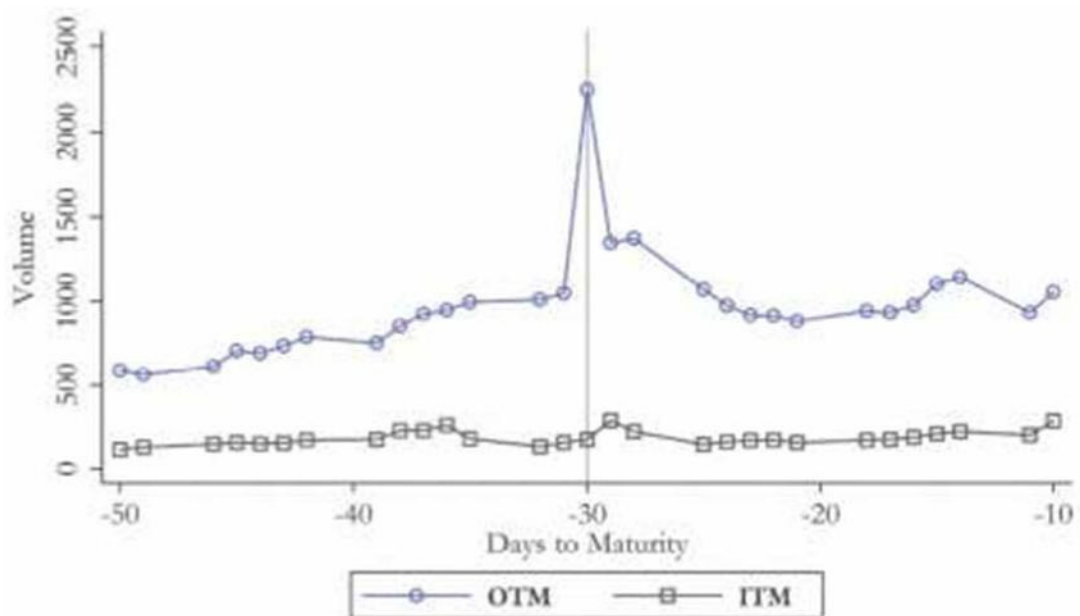
The settlement of VIX options and futures typically occurs on the third or fourth Wednesday of each month. The exercise-settlement value of VIX futures and options is calculated using the auction clearing prices of SPX options in an auction called the Special Opening Quotation (SOQ). To be included in the settlement auction, orders can be submitted and canceled by market participants and market makers prior to market open. Starting at 7:30 a.m. CST, given the orders submitted up to each point in time, best bid and ask and indicative prices for each option can be seen by market participants. Between 8:15 a.m. and 8:30 a.m., strategy orders, which are SPX option orders that are related to positions in VIX derivatives and span over a wide range of strikes with 30 days to maturity, can no longer be submitted or canceled. Only orders unrelated to outstanding VIX positions, including those submitted by liquidity providers, can be submitted after 8:15 a.m. At 8:30 a.m. CST, the CBOE executes SPX options orders at market-clearing prices and removes all remaining unexecuted orders.

80. Thus, the SOQ process was controlled by LMMs for the SPX Options market and in light of the types of repetitive suspicious trading patterns that Griffin and Sham found year after year, collusive manipulation is the only reasonable explanation.

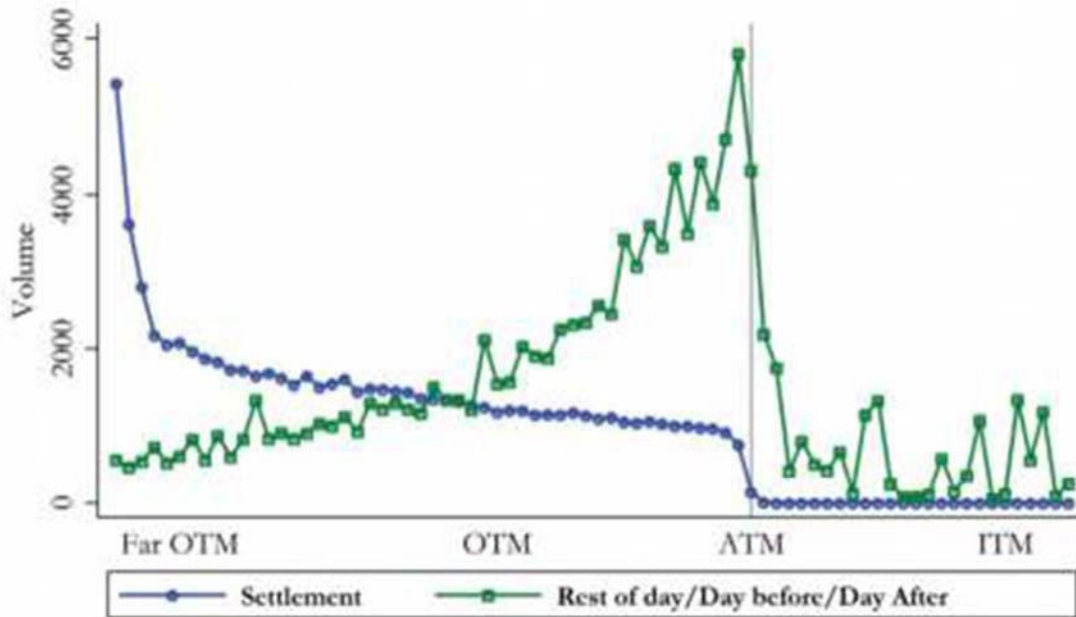
81. Analyzing trade data from January 2008 through April 2015, the Griffin-Shams article's findings suggest that traders deliberately engaged in trading activity designed to push the settlement price both up and down. For example, in months where the trading pushes the VIX settlement price up, the prevailing price of the VIX-influencing options will jump during the SOQ auction, peak at around 8:15 a.m. (*i.e.*, the deadline for VIX-related bids to be accepted for the SOQ prior to January of 2017), and then drop seconds after the auction ends, when SPX

Options revert to normal trading patterns.

82. The Griffin-Shams article also found that that “at the exact time of monthly VIX settlement [for VIX Futures and VIX Options], highly statistically and economically significant trading volume spikes occur in the underlying SPX options” and that the “spike occur only in the OTM [or out-of-the-money] SPX options that are included in the VIX [S]ettlement [Price] calculation and not in the excluded in-the-money (ITM) SPX options”:



83. The spike in out-of-the-money SPX Options during the settlement window occurs principally in (otherwise) rarely traded SPX Options that are priced the furthest out-of-the-money, and have a significant manipulative impact on the VIX Settlement Price:



84. Strong evidence of collusion is available by looking at fluctuations among: (a) the VIX benchmark at the day's prior close, (b) the SOQ settlement value, and (c) the VIX benchmark at the open of the day immediately following the SOQ calculation window – and, most importantly, through the direction in which the VIX was manipulated.

85. A review of recent VIX data and SOQ prices demonstrates just this type of manipulation. During the proposed Class Period, there are multiple instances of the SOQ having a lower value than both the previous day's close of the VIX and the opening of the VIX immediately after the SOQ. Remarkably, in some instances, the SOQ was pushed lower right before the opening of the VIX even when the VIX opened higher than it closed at the day before. In addition, the value of the SOQ, through the activity of SPX Options market makers and others, repeatedly settled at a value that was outside the entire range of the VIX both on the day before the SOQ and the same day of the SOQ. These repeated anomalous settlement values could have only occurred through multiple parties acting in concert to trade at artificial prices.

86. For example, on March 19, 2013, the VIX closed at 14.39. By the next day, on March 20, 2013, based on activity in just the relatively illiquid SPX Options market, the SOQ was 12.64, a

decrease of 12.16%. Upon the VIX opening immediately after the SOQ that same day, however, the VIX had returned to 13.18, representing a 4.27% increase from the SOQ value. On April 20, 2016, there was similar behavior indicative of collusion to drive down the SOQ. On April 19, 2016, the VIX closed at 13.24. By settlement on the morning of April 20, 2016, the SOQ was 12.38, a decrease of 6.5%. Upon the opening of the VIX immediately after the SOQ, however, the VIX had jumped back up to 13.39, representing an 8.16% increase from the SOQ value, and in fact, higher than the previous day's close. On September 20, 2016, the VIX closed at 15.92. By settlement the following morning, September 21, 2016, the SOQ was 14.92, a decrease of 6.28%. At the opening of the VIX immediately after, however, the VIX was 15.07, representing a 1.01% increase from the SOQ value.

87. On October 18, 2016, the VIX closed at 15.28. By settlement the following morning, October 19, 2016, the SOQ was 14.56, a decrease of 4.7%. At the opening of the VIX immediately after, however, the VIX had not only returned to its prior closing level, it was higher at 15.45, representing a 6.1% increase from the SOQ value.

88. Again, on December 19, 2017, the VIX closed at 10.03. By settlement the following morning, December 20, 2017, the SOQ was 8.75, a decrease of 12.76%. Upon the VIX opening immediately after the SOQ that same day, however, the VIX had returned to 9.69, representing a 10.74% increase from the SOQ value.

89. On February 13, 2018, the VIX closed at 24.97. By settlement the following morning, February 14, 2018, the SOQ was 21.87, a decrease of 12.41%. Upon the VIX opening immediately after the SOQ, however, the VIX had moved upwards 23.48, representing a 7.36% increase from the SOQ value.

90. Another relevant example is what happened on Wednesday, April 18, 2018. As explained in one article:

The VIX, which derives its price from S&P 500 options, was sailing along without incident until about 9am in New York, when it spiked as much as 11% in about an hour's time. The jump coincided with a Cboe auction in which a monthly settlement value is set for the gauge, one that is critical to owners of some of the most popular futures in the country.

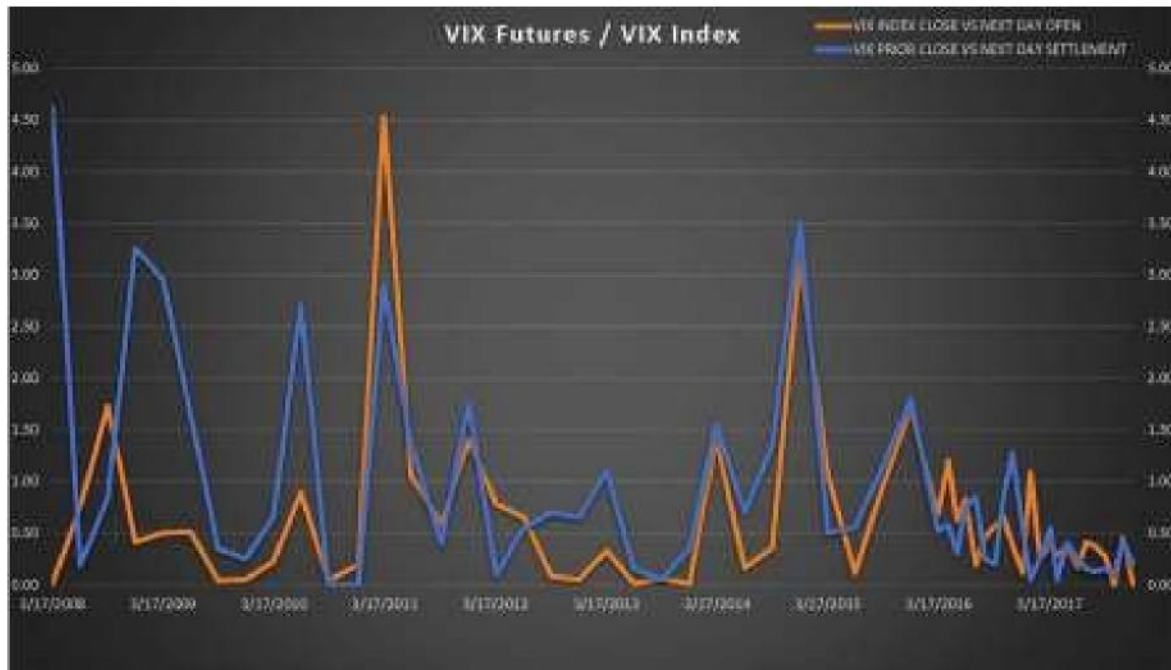
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Pravit Chintawongvanich, head of derivatives strategy at Macro Risk Advisors, saw evidence the VIX was pushed higher intentionally. Among other things, roughly \$2.1mn was spent in the runup to the settlement on "extremely irrelevant" options that were tied to a 50% drop in the S&P 500.

A trade of 13,923 May puts on the S&P 500, with a strike price of 1200, took place just as markets opened at 9:30am. Before Wednesday, the option was active only on five sessions in the past two months, with daily volume never exceeding 75 contracts.

"This feels odd. I don't think this is a coincidence," Chintawongvanich said. "With all the concern about the possible VIX manipulation in February and then this happening today, it's possible that the regulators would look at it more closely. It appears to me that the instrument is vulnerable to people who want to push it up."

91. A further analysis of sample data provided by the CBOE to cross-check the Griffin Paper shows signs of manipulation. For example, it can be observed that, in multiple instances, VIX Futures do not converge to the spot index at the Futures' expiration. This runs counter to what would be observed in a normally functioning, "clean" market. Not surprisingly, publication of the incriminating article caused the behavior of Defendants to alter and for there to be more (although still not perfect) convergence:



92. This type of manipulation contrary to both the pre-SOQ period closing and post-SOQ opening VIX levels requires multiple traders working in collusion, including at least some SPX Option market makers to drive down SPX options prices. Furthermore, it can be effectuated only as a result of CBOE's intentional decisions with respect to the calculation of the VIX and the SOQ, and CBOE's determination as to which firms get to participate as market makers in SPX Options and thus have the most influence over trades that impact the SOQ calculation.

### **III. VIX, VIX INSTRUMENTS, AND THE VIX SETTLEMENT PROCESS ARE VULNERABLE TO COLLUSION**

93. Timothy Klassen, a member of the Goldman Sachs team that assisted CBOE in the development of the VIX, said that "trying to manipulate the VIX is not conceptually different from trying to manipulate any other index" that is dependent on underlying financial contracts.

94. Market makers could collude and prearrange trades in order to manipulate the VIX settlement. Without collusion from the major players, the VIX could not be manipulated downward with any significant degree of frequency or to any substantial effect.

95. The market for VIX Instruments is large and liquid, which enables traders to invest in

a significant position that could benefit from a manipulated settlement. In contrast, many of the SPX options are illiquid. The Griffin-Shams article found that “the size of VIX futures with open interest at settlement is on average 5.7 times the size SPX options traded at settlement, and it is 7.3 times for VIX options that are in-the-money at settlement.” As such, traders profit disproportionately in this position by collusively trading and/or making markets in relatively smaller dollar value in SPX Options. In particular, manipulators working together can trade a strip of deep out-of-the-money SPX put Options (which have mechanically higher weighting than calls in the VIX formula), or set the market for those Options at predetermined levels, in order to drive the VIX settlement price higher by including these options in the calculation at a relatively *de minimis* cost and with little or no risk.

96. The CBOE did not, however, always use out-of-the-money SPX Options in its VIX calculation. Prior to 2003, the CBOE only used at-the-money and near-the-money strikes to determine VIX. In 2003, the CBOE redesigned the VIX calculation in consultation with Goldman Sachs. As part of that redesign, the CBOE included out-of-the-money strikes in its VIX calculation while also switching to use of the S&P 500 Index rather than the S&P 100 Index.

97. VIX Futures and Options are also prone to manipulation because they are cash settled. As a result, if the VIX settlement value deviates from its true value, the VIX position will automatically be cashed out at the deviated price. By contrast, futures contracts of a physical asset (*e.g.*, cattle, oil) have the opportunity to opt for physical delivery of the asset upon settlement. Even if the asset in question was trading at an inflated price, after the manipulative trader receives delivery of the asset, the price of that asset may quickly fall to the original — or actual market — value when the manipulator attempts to exit the position. As such, cash-settled instruments create an adverse incentive and are generally easier to manipulate.

98. Another aspect of the VIX settlement calculation that makes VIX Instruments vulnerable to manipulation is that settlement occurs based on a special opening value generated in a



single narrow window that is outside of normal trading hours. That combination means that a single manipulative trade can have a significant influence on the settlement calculation. Furthermore, trading in a narrow window outside of normal trading hours means that the Market Maker Defendants do not have to defend their manipulative trades over a longer period of time against market forces present during normal trading hours. If the SOQ settlement window was longer and during normal market hours, the Market Maker Defendants would have difficulty reaping their ill-gotten gains.

99. An additional aspect of the VIX settlement calculation that makes VIX Instruments vulnerable to manipulation is that there is a relatively *de minimis* 0.05 per option contract threshold for an SPX Option to be included in the settlement calculation. Combined with the ability to manipulate the VIX settlement calculation during only a single, relatively narrow window, Defendants can manipulate large positions in VIX Instruments cheaply and easily through SPX Options.

100. It is by now commonly believed in the financial markets that the design of the SOQ calculation methodology for the VIX settlement makes it readily susceptible to manipulation. Other, near-equivalent indices selected settlement calculations which included additional safeguards designed to prevent manipulation. For example, as Griffin and Shams note, the VSTOXX index, which is a European volatility index equivalent to the VIX and is traded through options and futures, does not use a single opening price. Instead, settlement of VSTOXX options and futures is based on the average of VSTOXX values calculated every five seconds over the course of a 30-minute trade window. In addition, VSTOXX options and futures are settled only using trades that have a premium of at least 0.5 euros. As a consequence, anyone wishing to manipulate the VSTOXX has to maintain the price discrepancy for a longer period of time at a higher cost, and at greater risk than they need to in order to manipulate the VIX.

101. Furthermore, the VSTOXX final settlement price is established by the Eurex

Exchange. The final settlement price is the average of the VSTOXX index values calculated every five seconds over the course of 30 minutes from 11:30-12:00 CET. The calculation occurs during normal market trading hours. In contrast, the VIX futures settlement occurs during an SOQ period prior to the opening of the market, which renders it much more prone to collusive manipulation by a small number of SPX Options traders and market makers.

102. The fact that VSTOXX is calculated as an average of the VSTOXX index values during normal market trading means that its value by definition always falls within and between the intraday high and low of VSTOXX on the settlement day. By contrast, the SOQ has, on 12 separate occasions since January 2012 – or 16.2% of the total 74 SOQ settlements in that time period – settled at a value outside of the intraday VIX highs/lows for both the day before the SOQ and the day of the SOQ, thus indicating a high susceptibility to and likelihood of coordinated manipulation of the SOQ settlement by SPX Options traders and market makers during the SOQ window:

SOQ Date	Day Before High	Day Before Low	SOQ Value	SOQ Day High	SOQ Day Low	Percent Outside Closest Limit
12/20/2017	10.15	9.18	8.75	9.85	8.9	-1.69%
10/18/2017	10.46	9.78	10.53	10.41	9.87	0.67%
8/16/2017	12.37	11.45	12.95	12.54	11.25	3.27%
2/15/2017	11.34	10.73	12.26	12.01	10.8	2.08%
11/16/2016	14.65	13.3	14.76	14.49	13.51	0.75%
4/20/2016	13.88	12.98	12.38	13.5	12.5	-0.96%
1/22/2016	13.42	12.61	12.36	13.12	12.55	-1.51%
11/20/2013	13.68	12.88	14.12	13.94	12.97	1.29%
9/18/2013	14.61	14.28	14.77	14.68	13.23	0.61%
6/19/2013	16.95	16.46	17.22	17.18	15.36	0.23%
10/17/2012	15.23	14.5	15.96	15.63	14.9	2.11%
1/18/2012	22.25	20.69	23.64	23.44	20.78	0.85%

103. Tellingly, the VIX futures volume is approximately double the VSTOXX futures volume. VIX futures have about 70% more open interest:



104. The Market Maker Defendants also take advantage of the fact that, in the event there is no opening trade, the CBOE uses the average of the bid and the ask price for the SPX Option as determined at the time of opening. This permits Market Maker Defendants in many instances to influence the VIX settlement calculation without even needing to use any capital.

105. The CBOE has failed to enforce its own regulations. The CBOE determines which firms are afforded market-making privileges in SPX Options, it determines the eligibility rules/requirements to be a market maker, and it shelters the identity of SPX Options market makers from public disclosure. LMMs for SPX Options receive commission discounts and other trading privileges by virtue of their respective roles as market makers.

106. The CBOE's decisions to: (a) incorporate out-of-the-money SPX Options in the VIX settlement calculation; (b) give greater weight to certain SPX Options; (c) not require a premium threshold for SPX Options to be included in the settlement calculation; (d) base the SOQ on a single

opening price; (e) sometimes use a special opening price based not on actual trades but solely on bid-ask spreads; and (f) grant SPX Options market-making privileges to some or all of the same institutions engaging in collusive and manipulative conduct. The CBOE's refusal to take definitive steps to cure these manipulations – guaranteed by its structure - due to its financial incentives are evidence of its bad faith.

#### **IV. INVESTIGATIONS AND COMPLAINTS**

107. As noted above, on February 12, 2018, an anonymous whistleblower who “has held senior positions at some of the largest investment firms in the world,” reported to the SEC and the CFTC about widespread manipulation of VIX. The whistleblower asserted that a “pervasive flaw” introduced by the CBOE permits “trading firms with sophisticated algorithms to move the VIX up or down by simply posting quotes on [SPX Options] and without needing to physically engage in any trading or deploying any capital.”

108. The whistleblower said that “the VIX is highly subject to manipulation by market participants with the ability to rapidly post quotes in the market for [an] S&P option.” Those participants include the SPX and/or SPXW LMMs identified above. This is the case not only because they have the resources necessary to engage in the sophisticated manipulation easily, but also because they are uniquely positioned to set prices on SPX Options used in the VIX settlement calculation. This effect is magnified when the opening price to determine the SOQ is not based on an actual trade, but rather a bid-ask spread. As also noted above, the SEC, the CFTC, and FINRA are all investigating the manipulation of VIX. Despite all of the foregoing and the suspicious activity on April 18, 2018, the CBOE continues to allow settlements for VIX Instruments to be determined with reference to the SOQ set for SPX Options.

#### **V. PLAINTIFF AND THE CLASS SUFFERED ANTITRUST INJURY**

109. The Market Maker Defendants injured Plaintiff and Class members by manipulating

the prices of VIX Instruments. The pricing of VIX Instruments is based on fundamental market forces of supply and demand. Specifically, the prices of VIX Instruments are inherently based on the VIX and the VIX SOQ. The Market Maker Defendants understood that they could directly or indirectly manipulate the prices of VIX Instruments through the manipulation of the VIX.

110. The Market Maker Defendants' combination, conspiracy, and/or agreement to manipulate the prices of VIX Instruments harms competition in the market for VIX Instruments in the United States. Absent the Market Maker Defendants' collusion with each other, those transacting in VIX Instruments would have transacted at competitive prices and reaped the benefits of competitive VIX settlement calculations. No one Market Maker Defendant could accomplish systematic and continuing manipulation of VIX and the VIX settlement process without coordinating with its rivals. Absent an agreement not to compete, the conduct alleged herein would be a risky strategy because market makers and swaps dealers would almost certainly be similarly positioned to profit from manipulation going into the settlement. The Market Maker Defendants benefited from coordinating their market activities.

111. The Market Maker Defendants' collusion caused VIX Instruments to trade at artificial prices.

112. The Market Maker Defendants' unlawful conduct deprives Plaintiff and Class members who transact in VIX Instruments of a competitive marketplace and exposes them to artificial volatility. The harm Plaintiff and the Class members have suffered is quantifiable. The added costs to Plaintiff and the Class members incurred due to the Market Maker Defendants' anticompetitive conduct results in artificial prices charged to investors in VIX Instruments.

113. Plaintiff and the Class members are suitable plaintiffs for pursuing antitrust violations by Defendants, insofar as they transacted in VIX Instruments during the Class Period, and thus were harmed by the Market Maker Defendants' anticompetitive conduct.

114. As a direct, intended, foreseeable, and proximate result of Market Maker Defendants' unlawful conspiracy and acts in furtherance of their conspiracy, Plaintiff and Class members have been injured in their business and property, in violation of federal antitrust laws. The injury to Plaintiff and Class members is the type the antitrust laws were designed to prevent and directly flows from Market Maker Defendants' unlawful anticompetitive conduct.

## **VI. DEFENDANTS FRAUDULENTLY CONCEALED THE MANIPULATION**

115. Any applicable statute of limitations has been tolled by Defendants' knowing and active concealment of the manipulation of the prices of VIX Instruments. Through no fault or lack of diligence, Plaintiff and Class members were deceived regarding Defendants' manipulation of the prices of VIX Instruments and could not reasonably discover the manipulation.

116. As alleged herein, the Market Maker Defendants' manipulation of the prices of VIX Instruments was material to Plaintiff and Class members at all relevant times. Within the time period of any applicable statutes of limitations, Plaintiff and Class members could not have discovered through the exercise of reasonable diligence that the Market Maker Defendants were manipulating the prices of VIX Instruments, in part because the trading records and roster of SPX market makers are concealed.

117. From the time that the Griffin-Shams article was published, the CBOE has also denied that any manipulation occurred. It heavily criticized the article and called its accuracy into question.

118. On December 20, 2017, when the VIX Index plunged as a result of a settlement price that was 13 percent below the prior day's close. William Speth, Vice-President of Global Research at CBOE Global Markets asserted that "[w]e have not identified anything that looks out of the ordinary, other than the optics of the big drop from one day to the next.... We have built numerous structural safeguards into the VIX settlement process that are specifically designed to make it difficult for traders to improperly influence the settlement price. Separately, our regulatory group activity

monitors for any improper conduct related to VIX settlement.”

119. When news of the whistleblower letter to the SEC and CFTC became public in February of 2018, a CBOE spokesperson said “[t]his letter is replete with inaccurate statements, misconceptions and factual errors, including a fundamental misunderstanding of the relationship between the VIX Index, VIX futures and volatility. As a result of these errors, we feel the conclusionary statements contained in this letter lack credibility.”

120. On April 23, 2018, the CBOE issued a letter to customers on the VIX crisis. It asserted that the events of April 18, 2018 described above were explainable as being brought about by six buy orders that and nine offsetting sell orders “appeared consistent with the weights prescribed by the VIX index formula.” It said that “[t]he buy order imbalance contributed to the opening prices of the option series that were used to calculate the final VIX settlement value.” It contended that “notwithstanding that the auction process functioned as intended, notwithstanding that the final settlement value was higher than what participants may have otherwise expected.”

121. In its letter, the CBOE noted that what happened on April 18 “mirrors a larger liquidity trend we have recently observed on VIX monthly markets” and admitted for the first time that it was “assessing steps that Cboe can take to enhance the VIX settlement process and attract more liquidity to our settlement auction.”

122. Notwithstanding the admitted necessity to take curative efforts, the CBOE repeated prior statements that the allegations of manipulation of VIX in various lawsuits were “without merit” and that “if our regulatory efforts were to uncover any manipulation, it would be rooted out, swiftly and decisively”.

123. Plaintiff and Class members did not discover and did not know of any facts that would have caused a reasonable person to suspect that Defendants were manipulating the prices of VIX Instruments.

124. Defendants knowingly, actively, and affirmatively concealed the facts alleged herein, including their manipulation of the prices of VIX Instruments. Plaintiff and Class members reasonably relied on Defendants' knowing, active, and affirmative concealment. Thus, all applicable statutes of limitation have been tolled based on the discovery rule and Defendants' fraudulent concealment, and Defendants are estopped from relying on any statutes of limitations.

### **CLASS ACTION ALLEGATIONS**

125. Plaintiff brings this action under Federal Rules of Civil Procedure 23(a) and 23(b)(1), (b)(2), and (b)(3) on behalf of himself and all members of the Proposed Class:

All persons (i) who traded long VIX Futures, long VIX call Options or short VIX put Options in the United States, its territories, or the District of Columbia on or after January 1, 2008 whose contracts expired on specific dates when the SOQ was manipulated downward; (ii) who traded short VIX Futures, short VIX call Options, or long VIX put Options in the United States, its territories, or the District of Columbia on or after January 1, 2008 whose contracts expired on specific dates when the SOQ was manipulated upward; or (iii) who traded in VIX ETPs in the United States, its territories, or the District of Columbia, on or after January 1, 2008. Excluded from the Class are Defendants; the officers, directors, or employees of any Defendant; any entity in which any Defendant has a controlling interest; any affiliate, legal representative, heir, or assign of any Defendant and any person acting on their behalf. Also excluded from the Class are any judicial officers presiding over this action and the members of his/her immediate family and judicial staff, and any juror assigned to this action.

126. The Class is readily ascertainable and its members consist of those for which records should exist, including, specifically, Defendants' records and transaction data.

127. Due to the nature of the trade and commerce involved, Plaintiff believes that there are thousands of geographically dispersed Class members, the exact number and their identities being known to Defendants, or capable of identification via third parties.

128. Plaintiff's claims are typical of the claims of the members of the Class.

129. Plaintiff and members of the Class sustained damages arising out of Defendants' common course of conduct in violation of the laws alleged herein. The damages and injuries of each



member of the Class were directly caused by Defendants' wrongful conduct.

130. There are questions of law and fact common to the Class, including, but not limited to, the following:

- Whether the Market Maker Defendants engaged in a conspiracy with each other to manipulate the prices of VIX Instruments;
- Whether manipulation of the SOQ process had an impact on the value or prices of shares or notes in VIX ETPs;
- Whether the Market Maker Defendants' conduct is a *per se* violation of Sections 1 and 3 of the Sherman Act;
- Whether the Market Maker Defendants' conduct constitutes manipulation under the Commodity Exchange Act;
- The identity of all of the Market Maker Defendants in the conspiracy;
- Whether the CBOE failed to enforce bylaws, rules, or regulations, in violation of the Commodity Exchange Act; and
- The appropriate classwide measure of damages.

131. Plaintiff will fairly and adequately protect the interests of the members of the Class. Plaintiff's interests are aligned with, and not antagonistic to, those of the other members of the Class, and Plaintiff has retained counsel competent and experienced in the prosecution of class actions and financial litigation to represent himself and the Class.

132. Questions of law or fact that are common to the members of the Class predominate over any questions affecting only individual members of the Class.

133. A class action is superior to other available methods for the fair and efficient adjudication of this controversy. The prosecution of separate actions by individual members of the Class would impose heavy burdens on the courts and Defendants and would create a risk of inconsistent or varying adjudications of the questions of law and fact common to the Class. A class action, on the other hand, would achieve substantial economies of time, effort, and expense and

would assure uniformity of decision as to persons similarly situated without sacrificing procedural fairness or bringing about other undesirable results. Absent a class action, it would not be feasible for the vast majority of the members of the Class to seek redress for the violations of law alleged herein.

### **CLAIMS FOR RELIEF**

#### **CLAIM ONE**

##### **Violation of §§1 and 3 of the Sherman Act 15 U.S.C. §1 and §3** **(Against Defendants Other Than CBOE)**

134. Plaintiff repeats and incorporates by reference each of the foregoing allegations of this Complaint.

135. Beginning at least as early as January 1, 2008, and continuing through the present, the exact dates being unknown to Plaintiff, the Market Maker Defendants entered into and engaged in a conspiracy in unreasonable restraint of trade in violation of Section 1 and 3 of the Sherman Act, 15 U.S.C. §§ 1, 3.

136. Plaintiff alleges a contract, combination, or conspiracy exists between or among the Market Maker Defendants that unreasonably restrains and/or eliminates trade. The conspiracy consisted of a continuing agreement, understanding, or concerted action between and among Defendants and their co-conspirators in furtherance of which the Market Maker Defendants fixed, maintained, or made artificial prices related to VIX Instruments as alleged herein.

137. There is no legitimate business justification for, or procompetitive benefits caused by, the Market Maker Defendants' unreasonable restraint of trade. Any ostensible procompetitive benefit was pretextual or could have been achieved by less restrictive means.

138. The Market Maker Defendants' conspiracy is a *per se* violation of the Sherman Act and is, in any event, an unreasonable and unlawful restraint of trade. This contract, combination, or conspiracy had anticompetitive effects, as alleged herein.

139. As a direct, intended, foreseeable, and proximate result of the Market Maker Defendants' conspiracy and overt acts taken in furtherance thereof, Plaintiff has suffered injury. The injury to Plaintiff and members of the Class are of the type the antitrust laws were designed to prevent and flow from that which makes the Market Maker Defendants' acts unlawful.

140. Defendants are engaged in commerce in the United States, its territories and the District of Columbia and the anticompetitive conduct alleged herein involves VIX Instruments that are in the flow of interstate commerce and which will and has substantially impacted interstate commerce because VIX Instruments are traded by investors throughout the United States.

141. WHEREFORE, Plaintiff and the Class members request the Court to enter judgment in their favor against the Market Maker Defendants, jointly and severally, awarding all damages, in an amount to be proven at trial, costs, and such other relief as the Court deems appropriate and just.

**CLAIM TWO**  
**Manipulation in Violation of the Commodity Exchange Act**  
**(Against Defendants Other Than CBOE)**

142. Plaintiff repeats and incorporates by reference each of the foregoing allegations of this Complaint.

143. Each Market Maker Defendant, individually, in concert, and/or as one another's control persons or agents, through their acts alleged herein, specifically intended to and did cause unlawful and artificial prices of VIX Futures and Options contracts in violation of the Commodity Exchange Act, 7 U.S.C. § 1, *et seq.*

144. The Market Maker Defendants' manipulative conduct and trading activity alleged herein constituted a manipulation of the prices of VIX Instruments in violation of Section 4b(a), 4c(a), 9(a) and 22(a) of the Commodity Exchange Act, 7 U.S.C. §§ 6b(a), 6c(a), 13(a)(2), and 25(a). As a direct result of Market Maker Defendants' unlawful conduct, Plaintiff and members of the proposed Class have suffered actual damages and injury in fact due to artificial prices for VIX

Instruments to which they would not have been subject but for the unlawful conduct alleged herein.

145. Plaintiff and members of the proposed Class were further legally injured and suffered injury in fact when they transacted VIX Instruments in an artificial and manipulated market operating under the artificial prices caused by the Market Maker Defendants. Plaintiff and members of the proposed Class are each entitled to their actual damages for the violations of the Commodity Exchange Act alleged herein.

### **CLAIM THREE**

#### **Aiding and Abetting Manipulation in Violation of the Commodity Exchange Act (Against Defendants Other Than CBOE)**

146. Plaintiff repeats and incorporates by reference each of the foregoing allegations of this Complaint.

147. The Market Maker Defendants by, *inter alia*, using VIX features introduced by CBOE and through the collusive posting of quotes and trading of SPX Options, knowingly aided, abetted, counseled, induced, and/or procured the violations of the Commodity Exchange Act by other Market Maker Defendants as alleged herein. The Market Maker Defendants further coordinated their trading and market activity for the purposes of manipulating VIX Instruments.

148. Each Market Maker Defendant did so knowing of the other Market Maker Defendants' manipulation of the prices of SPX Options underlying the prices of VIX Instruments. The conduct alleged herein demonstrates that Market Maker Defendants substantially and willfully intended to assist these manipulations so as to cause prices of VIX Instruments to be artificial, in violation of Section 22(a)(1) of the CEA.

149. Under Section 13c(a) of the CEA, 7 U.S.C. §13, Market Maker Defendants are liable for willfully intending to assist the manipulation.

150. Other persons willfully intended to assist these manipulations to cause VIX

Instruments to trade at artificial levels--the agents and unnamed co-conspirators as alleged herein --in violation of § 22(a)(1) of the CEA, 7 U.S.C. § 25(a)(1).

151. Plaintiff and members of the proposed Class are each entitled to actual damages sustained for the violations of the Commodity Exchange Act alleged herein.

#### **CLAIM FOUR**

##### **Manipulation by False Reporting and Fraud and Deceit in Violation of the Commodity Exchange Act (Against Defendants Other Than CBOE)**

152. Plaintiff repeats and incorporates by reference each of the foregoing allegations of this Complaint.

153. Under Section 6(c)(1) of the Commodity Exchange Act, as amended, codified at 7 U.S.C. § 9, and Section 22 of the Commodity Exchange Act, as amended, 7 U.S.C. § 25, it is unlawful for any person, directly or indirectly, to use or employ, or attempt to use or employ, in connection with any swap, or a contract of sale of any commodity in interstate commerce, or for future delivery on or subject to the rules of any registered entity, any manipulative or deceptive device or contrivance, in contravention of such rules and regulations as the CFTC shall promulgate.

154. 155. In July of 2011, the CFTC promulgated Rule 180.1(a), 17 C.F.R. § 180.1(a) (2011), pursuant to Section (6)(c)(1), which provides, in relevant part:

It shall be unlawful for any person, directly or indirectly, in connection with any swap, or contract of sale of any commodity in interstate commerce, or contract for future delivery on or subject to the rules of any registered entity, to intentionally or recklessly:

(1) Use or employ, or attempt to use or employ, any manipulative device, scheme, or artifice to defraud;

(2) Make, or attempt to make, any untrue or misleading statement of a material fact or to omit to state a material fact necessary in order to make the statements made not untrue or misleading;

(3) Engage, or attempt to engage, in any act, practice, or course of business which operates or would operate as a fraud or deceit upon any person; or

(4) Deliver or cause to be delivered, or attempt to deliver or cause to be delivered for transmission through mails or interstate commerce, by any means of communication whatsoever, a false or misleading or inaccurate report concerning crop or market information or conditions that affect or tend to affect the price of any commodity in interstate commerce, knowing or acting in reckless disregard of the fact that such report is false, misleading or inaccurate.

155. Unlawful manipulation under the Commodity Exchange Act, as amended, and Rule 180.1 includes delivering, or causing to be delivered for transmission through the mails or interstate commerce, by any means of communication whatsoever, a false or misleading or inaccurate report concerning market information or conditions that affect or tend to affect the price of any commodity in interstate commerce, knowing, or acting in reckless disregard of the fact that such report is false, misleading, or inaccurate.

156. During the Class Period, the Market Maker Defendants used or employed manipulative or deceptive devices or contrivances, in connection with a contract of sale or purchase of SPX Options and VIX Instruments in interstate commerce. This conduct included the making of untrue, inaccurate, or misleading statements of material facts, or omitting material facts necessary to make the statements made not misleading, such as the posting or bidding on of artificial prices for SPX Options in order to influence the prices of VIX Instruments, and failing to disclose that the Market Maker Defendants entered pre-arranged transactions to move the prices of VIX Futures and Options in a direction to benefit their own trading books.

157. The Market Maker Defendants' conduct caused injury to Plaintiff and other members of the Class who transacted in an artificial and manipulated market, at manipulated prices, and with artificial price trends, during the Class Period.

158. Plaintiff and other members of the Class are each entitled to damages for the violations of the Commodity Exchange Act alleged herein.

**PRAYER FOR RELIEF**

Plaintiff requests relief as follows:

- A. That the Court determine that this action may be maintained as a class action under Federal Rules of Civil Procedure 23(a), (b)(1), (b)(2), and (b)(3), and direct that notice of this action, as provided by Rule 23(c)(2) of the Federal Rules of Civil Procedure, be given to Class members;
- B. That the Court enter an order declaring that Defendants' actions, as set forth in this Complaint, violate the law;
- C. That the Court award Plaintiff and Class members damages, treble damages, punitive damages, and/or restitution in an amount to be determined at trial;
- D. That the Court issue appropriate injunctive and other equitable relief against Defendants;
- E. That the Court award Plaintiff pre- and post-judgment interest;
- F. That the Court award Plaintiff his costs of suit, including reasonable attorneys' fees and expenses; and
- G. That the Court award any and all such other relief as the Court may deem just and proper.

**JURY DEMAND**

Pursuant to Federal Rule of Civil Procedure 38, Plaintiff, on behalf of himself and the Proposed Class, demands a trial on all issues so triable.

Date: June 1, 2018

**WOLF HALDENSTEIN ADLER  
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